Original Research Article

A prospective comparative study of TZANAKIS score versus ALVARADO score in the effective diagnosis of acute appendicitis

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ABSTRACT

Background: Multiple scoring systems have been addressed to identify those patients who need emergency appendicectomy as the risk of delay could be avoided. Of these, the consideration of both sore related to the Alvarado and Tzanakis is essential for the study to understand the effective diagnose of acute appendicitis.
Aim: The study aims to compare and evaluate Alvarado and Tzanakis score for diagnosing the acute appendicitis.
Materials and Methods: This study was conducted in the department of General Surgery associated with the M.K.C.G, Medical College and Hospital, Berhampur from August, 2018 to July, 2020. A total of 96 patients were being considered for carrying out a systematic study after carefully verifying a variety of the inclusion and exclusion criteria. To conduct the study in a systematic manner, the doctor has analyzed and given the score of Alvarado and Tzanakis. On the basis of score of these two approaches, the medical team has provided the treatment to these patients. The proper identification of score has helped to select the method of operation and surgery. In addition to this, the comparison of score focusing on the NPV and PPV has also allowed for identifying the sensitivity.
Results: The Alvarado and Tzanakis score was found to have sensitivity along with the specificity of 94.44% and 83.33% respectively. However, the PPV and NPV was found to be 98.84% and 50.00% respectively as compared to Alvarado score where sensitivity, specificity, PPV and NPV was found out to be 77.77%, 66.66%, 97.22% and 16.66% respectively.
Conclusion: From the study, it has carried out that the Tzanakis scoring system has been addressed a more reliable for analyzing the condition of patients and offering the treatment. Diagnostic. Alvarado score, with the former achieving higher sensitivity and PPV.

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1. Introduction

In the current scenario, the disease related to Acute appendicitis are emerged as the life threatening issues across the world. The incident of this disease are occurring in every 1.17 in 1000 people. These people are having risk rate of 8.6% in male and 6.7% in the female patients.[1] This has become one of the most common type of disease among the people and influencing the life style and approach of the individual.

According to the analysis, the high percentage of negative type of appendicenctomy was found in the 20% of the patients and it requires the proper treatment option to manage the health of the individual.[2] The improvement in the level of accuracy and diagnosing the issues related to disease is helpful for minimizing the risks and complexity to manage the health condition of people. Apart from this, the lack of analysis and evaluation can increase the chances of

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morbidity and mortality. The utilization of technology like ultra-sonography is beneficial for diagnosing the issue and planning of the actions to improve health of the people.[3] Diagnostic accuracy could be improved with the help of ultrasonography along with the computed tomography imaging.[4] However, these modalities are costly and may not be easily available when they are required.

To identify the issues, there are various scoring systems have been used that are having good results and providing the accurate information related to health of the individual. The prior analysis of risks and emergency is helpful for arrangement of the resources and applying the techniques to meet the needs and expectations of individual.[5] However, these scoring systems are not offering the information related to type of surgery is required for improving the health of the patients. Of these, Alvarado score system[6] and Tzanakis scoring system[7] are two of the most widely studied.

The proper understanding and implementation of Alvarado system for managing the health can be beneficial for reducing the negative impact of appendicectomy to 0-5%. The modification in the approach can be done using this scoring system and influence the approach of treatment. According to analysis, the Alvarado system score involve 8 different parameters and that could be useful for evaluating the health of the individual and planning of the treatment approach to improve health condition of patients.[8] For understanding the score the different parameters are applied that vary between 1 and 2. In addition to this, the summation of score is allowing the medical team for treatment modality. As per the analysis of care authorities for particular disease the score of 7 or more is strongly predictive for acute appendicitis. However, the patients with score of 5-6 are having more changes of disease and required the support of medical staff. On the other hand, Tzanakis scoring system is a simplified system with four variables and total score of 15 for diagnosis of appendicitis.[9] This scoring system incorporated ultrasound scanning along with clinical and laboratory findings to predict the diagnosis of appendicitis.

2. Aim

This study aims to examine the predictability of Alvarado and Tzanakis scoring system for carrying out the preoperative diagnosis of acute appendicitis and supports researcher in managing a systematic comparison of its accuracy with reference to histopathological examination.

3. Material and Methods

This study encompasses 96 patients that have been presented to emergency department of M.K.C.G Medical College & Hospital, Berhampur with right iliac fossa (RIF) pain with nausea, vomiting, vomiting, anorexia, and other symptoms determined for the acute appendicitis were admitted to General Surgery Department during the period of August, 2018- July, 2020.

3.1. Inclusion criteria

All patients clinically examined with the acute appendicitis addressed the open or laparoscopic appendicectomy.

3.2. Exclusion criteria

1. Patients did not find appropriate level of fitness or not willing for getting a surgery.
2. Appendicular perforation, Appendicular abscess, Appendicular mass.
3. Patients <18 years.
4. Patients who were not willing to be a part of study.
5. Pregnant women.

3.3. Ethical clearance

The present study was approved by the Institutional Ethical Committee of M.K.C.G, Medical College & Hospital, Berhampur on human subject research.

3.4. Procedure

Upon admission, the assessment of the medical history along with the clinical examination was done to all types of patients. With reference to individual medical review different of signs and symptoms. The score of Alvarado score and Tzanakis were considered for identifying the suspect and planning of the actions to admission and prior to surgery. The consideration of the score of both tests can be beneficial for the investigation of the problems among the patients and planning of the treatment process. The care professionals are analyzing the scores and making the decisions for applying the medical dragons and services that requires for improving the conditions of patients. In addition to this, the score is biased free and helping to understand the situation of emergency and offering the treatment.

Informed written consent was taken from patient planned for appendicectomy and identification of this is consider as serious issue and all these patients were sent to hospitals for specific treatment and their data has been recorded for further treatment planning. All necessary blood investigations such as (Hb, TLC, RBS, WBC count, Screening Tests) were conducted. Reports were used in Alvarado and Tzanakis analysis.[10] The use of technology like ultrasound for abdomen is done for all the cases and the ultrasound finding can be useful for Tzanaekis system, final diagnosis was being aligned by Histopathological Examination and it is also specimen by the pathologist.

3.5. Data collection and statistical analysis

Data was collected according the predesigned standard Case proforma and compiled and tabulated in Microsoft® Excel®

for Windows® and statistical analysis was done using IBM® SPSS® Version- 24.0 for Windows®. Using cut off value of each score (Alvarado ≥7, Tzanakis ≥8) in assessing high probability of acute appendicitis, statistical data was used to determine PPV (positive predictive value), NPV (negative predictive value) that is helpful for offering the support for the patients considering the level of sensitivity. Apart from this each score from TP (true positive), TN (true negative), FP (false positive), FN (false negative) values consider for further treatment.

4. Results

Table 1: Age and sex incidence

Age in years	Male	Female	Total
18-23 Yrs.	11	10	21
24-29 Yrs.	14	19	33
30-35 Yrs.	13	15	28
36-41 Yrs.	5	7	12
42-47 Yrs.	2	0	2
Total	45	51	96
Mean ± SD (Years)		28.78 6.054	

As per Table 1, the majority of cases was found in the age category between 24-29 years that is 33 cases (34.37%) and minimum cases was found among those individual that were associated with between 42-47 years that is 2 cases (2.08%). Mean age was found to be 28.78 years with Standard Deviation of 6.054. In the present study, with the study population of 96, there were 45 males (46.9%) and 51 females (53.1%) with Male to Female ratio of 0.88:1.

Table 2: Distribution of cases using alvarado score and tzanakis score

Score Cut Off	Positive Acute Appendicitis (Positive HP)	Negative Acute Appendicitis (Negative HP)	Total Cases
ALVARADO≥7	70 (TP)	2 (FP)	72
ALVARADO≤6	20 (FN)	4 (TN)	24
Total Cases	90	6	96
TZANAKIS≥8	85 (TP)	1 (FP)	86
TZANAKIS≤7	5 (FN)	5 (TN)	10
Total Cases	90	6	96

As per Table 2, at the optimal value of cut off score of ≥8 for the Tzanakis score, the calculated value of the sensitivity as well as specificity were being recorded 94.44% and 83.33% respectively with reference to 77.77% and 66.66% respectively for Alvarado Score at cut off value ≥7. The positive predictive value (PPV) and negative predictive value (NPV) for Tzanakis score at cut off value of ≥8 was 98.84% and 50 % respectively compared with 97.22 % and 16.66 % respectively for the Alvarado score using cut off value of ≥7.
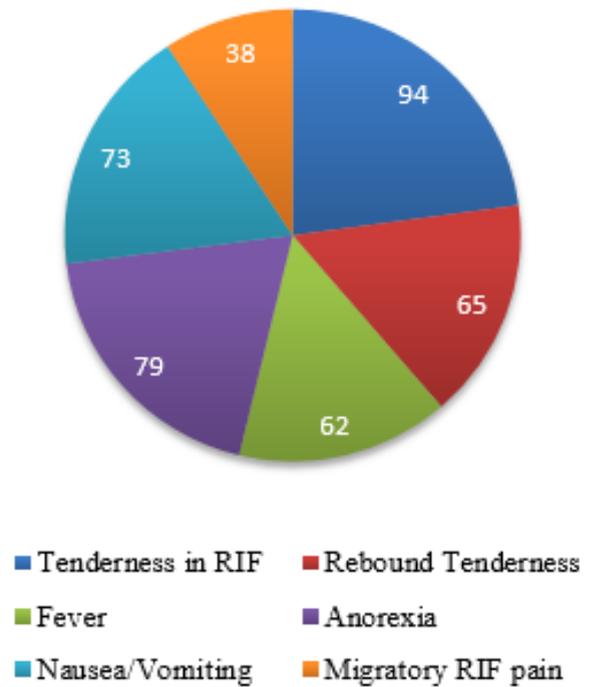

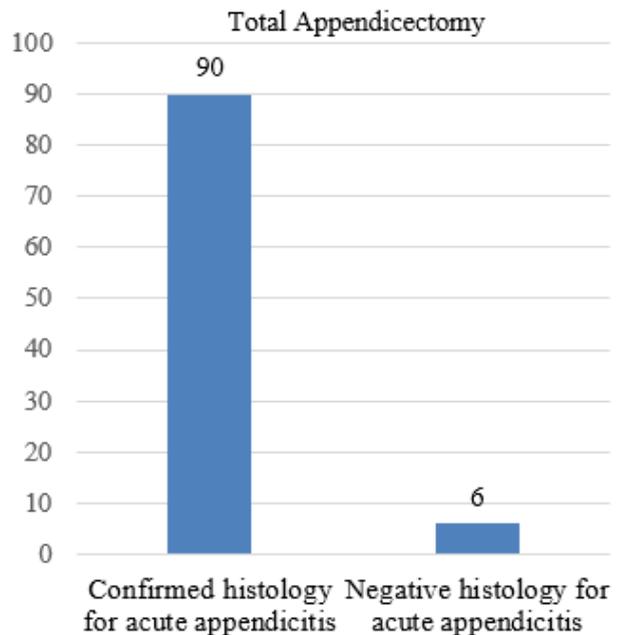**Fig. 1:** Signs and symptoms

Fig. 2: Histopathology after appendicectom

Although, NPV of Tzanakis Scoring System is only 50% but the NPV of Alvarado scoring System is very low but PPV is comparable in both scoring systems. According to analysis, the process of ROC and score was 0.833 and 0.614 for the Tzanakis and Alvarado Scoring System. Therefore, it can be concluded that the area under the curve is more in Tzanakis Scoring System than Alvarado Scoring System. Now, it is essential for implementing the score and assessment of the acute appendicitis.

5. Discussion

The consideration of analysis of study and findings is helping to understand the impact and comparison of Alvarado score with Tzanakis score. According to analysis of study, the score of Tzanakis is useful and better for gaining the information related to the health condition of patients and the Alvarado is providing the information related to accuracy of the diagnose system to offer the information about the process of diagnose (sensitivity, specificity, PPV and NPV).[11] In the study conducted by Sigdel GS et al they found that at the optimal cut off threshold score of ≥8 for the Tzanakis score, the examined the sensitivity with specificity were respectively 91.48% and 66.66%, in comparison to 81.81% and 66.66% respectively for Alvarado score at an optimal cut off threshold of ≥7. Alvarado and Tzanakis score was 97.72% and 33.33% respectively, compared with 97.46% and 19.04% respectively for the Alvarado score.[12]

Furthermore the study that completed by Malla et al they addressed that identified the level of score of ≥8 for the Tzanakis score, the calculation of Alvarado and Tzanakis were 86.95% and 75% respectively, compared with 76% and 75% respectively for Alvarado score at an optimal cut off threshold of ≥7.[13] The PPV and NPV for the Tzanakis score were 97.5% and 33.33% respectively, compared with 97.2% and 21.42% respectively for the Alvarado score.[14]

Thus, the Tzanakis score has been emerged as a more useful diagnostic tool for dealing with the acute appendicitis, especially in emergency setting as it needs only clinical examination (right lower abdominal tenderness and rebound tenderness) and two easy studies (WBC count and USG abdomen and pelvis). With its high sensitivity (94.44%) and PPV (98.84%) it can control the negative appendicectomy rate and can thus help in reducing the annual healthcare expenditure.

6. Conclusion

A total of 96 patients was being considered in the present investigation who were admitted to the emergency department with acute right lower abdominal pain associated with anorexia, fever, nausea and vomiting suggestive of acute appendicitis were taken for the study. ALVARADO and TZANAKIS scores were given to each patient. Appendicectomy was done for all the patients and the specimen was sent for histopathological study.

In the present study, different parameters such as issues related to positive and predictive value of specificity and sensitivity needed to be negative. The negative value of predictive value of Alvarado score that was found from the evaluation is 77.77%, 66.66%, 97.22% and 16.66% respectively. Apart from0 this, the Tzanakis scoring system, sensitivity, specificity, positive predictive value was found to be 94.44%, 83.33%, 98.84% and 50.00% respectively. Therefore, it can be considered that score of Tzankis was better and effective for identifying the issues among the patients and offering the support. The analysis of value of Alvarado was significantly higher and positive that could be considered as predictive value for the analysis. By clinical examination and two simple investigations related to white cell count and ultrasound abdomen and pelvis). Based on it a quick decision that can be made with reference to views of on call surgical team, further decision would be taken related to discharge or further observations. In terms of healthcare cost savings, the Tzanakis score can reduce avoidable patients admissions.

7. Source of Funding

8. Conflict of Interest

The authors declare they have no conflict of interest.

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